# FOREST PRODUCTS
Project Fact Sheet

## PHOTOACTIVE ION EXCHANGE RESINS

### BENEFITS

- Decreases water use and wastewater discharges during pulp and paper manufacturing
- Lowers manufacturing costs for the industry

### APPLICATIONS

This technology will be made available to help the pulp and paper industry reduce its wastewater stream.

## Unwanted Metals Can Be Easily Removed from the Process Stream of Pulp and Paper Mills

The pulp and paper industry has a major opportunity to reduce its water consumption and wastewater discharges if it can recycle and reuse its process water. However, the presence of certain metal ions in the water, such as manganese, iron, magnesium, and calcium, can create problems such as scale formation and catalytic deactivation and limit the ability of manufacturers to recycle their process water. Methods are needed to remove these unwanted metals to make it easier for pulp and paper manufacturers to reuse water from their industrial processes. The Department of Energy's National Renewable Energy Laboratory (NREL) has developed a photoactivated ion exchange resin that can serve as the medium for capturing the metal contaminants in the industrial wastestream.

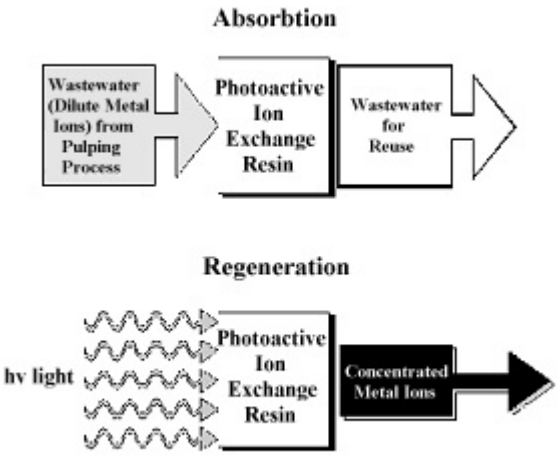


Figure 1. A diagram of the absorption and regeneration functions of NREL's unique resin product.

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## PROJECT DESCRIPTION

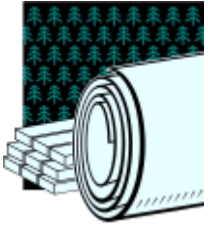
**Goal:** To develop a new technology for use in pulp and paper manufacturing to remove unwanted metals from waste streams in order to recycle water from their industrial processes.

NREL's unique resin operates by capturing metal ions at one stage of the process, and releasing them in a concentrated stream later in the operation. The release of ions from the resin and regeneration of the resin are easily accomplished in the presence of light. Additional research and development were carried out to prepare dyes used to adsorb the metal-ion contaminants. Their molecular structure was specific to the metal ions present in pulping processes, and was based on derivitized spiropyrans and related compounds. While some dyes had already been synthesized, others had to be prepared.

Screening studies, using standard procedures, were conducted to select the most appropriate structural properties of promising dyes. The dyes were affixed to a support medium compatible with the engineering requirements of the water-treatment system (e.g., glass microbeads, polymer beads, cellulosic materials). A prototype reactor in which to carry out the wastewater/dye/resin treatment was built and tested. Small pilot-scale testing was conducted at a working pulping plant to demonstrate the prototype technology and discover areas for additional improvements.

## PROGRESS & MILESTONES

- This project was successfully completed.



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